	WHAT IS CLAIMED IS:					
1		1.	A method to create a digital model of a patient's teeth, comprising:			
2		creating an impression of the patient's teeth;				
3		scanning the impression using an X-ray source; and				
4		generating the digital model with scanned data.				
1		2.	The method of claim 1, further comprising using passing the radiation			
2	source through a scintillator.					
1		3.	The method of claim 2, further comprising digitizing the output of the			
2	scintillator.					
1.1	a plastic tray.	4.	The method of claim 1, wherein the impression of the teeth is taken in			
132 151 102	a plastic traj.					
F1		5.	The method of claim 1, further comprising taking a bite impression of			
(02 (0	the patient.					
1		6.	The method of claim 5, wherein the bite impression is taken using a			
i 2	PVS material					
1		7.	The method of claim 5, wherein the bite impression is taken using a			
ĬŪ 2	wax bite.					
1		8.	The method of claim 1, wherein an upper teeth impression, a lower			
2						
1		9.	The method of claim 8, further comprising digitally reversing data			
2	from the uppe	er and l	ower impression scan data to make positive data.			
1		10.	The method of claim 9, wherein the digital reversing identifies inner			
2	surfaces of ar	ı impre	ssion material and extracting the inner surfaces using a largest connecte			

1 11. The method of claim 1, further comprising aligning data into a bite 2 position using the bite material scanned.

3

component algorithm.

1		12.	The method of claim 1, further comprising digitally detailing the teeth			
2	data.					
1		13.	The method of claim 1, further comprising setting a final bite.			
1		14.	The method of claim 1, further comprising articulating the digital			
2	model.					
1		15.	The method of claim 1, further comprising treating a patient using the			
2	digital model.					
1		16.	The method of claim 1, further comprising:			
2		gener	ating a computer representation of a masticatory system of the patient;			
(33	and	_				
134		deterr	nining an occlusion from the computer representation of the masticatory			
124 125 14	system.					
i i i 1		17.	The method of claim 16, wherein the occlusion is a static occlusion,			
2	further compa	rising:				
i		mode	ling an ideal set of teeth;			
54		auton	natically applying the ideal set of teeth to the computer representation of			
135	a masticatory system of the patient; and					
6		optin	nizing the position of the patient's teeth to fit the ideal set of teeth.			
1		18.	The method of claim 17, wherein the modeling step further comprises			
2	selecting one or more arch forms specifying the ideal set of teeth.					
1		19.	The method of claim 17, wherein the masticatory system includes jaws			
2	and wherein the applying step includes:					
3	11.04					
4						
5		simulating the motion of the jaws to generate contact data between the upper				
6	and lower teeth; and					
7		nlaci	ng a tooth in a final position based on the contact data.			

1		20.	The method of claim 19, wherein the model is registered using X-ray			
2	data.					
			The second secon			
1		21.	The method of claim 19, wherein the model is registered using			
2	computed tomography data.					
1		22.	The method of claim 19, wherein the model is registered using data			
2						
2	associated with a mechanical model.					
1		23.	The method of claim 19, wherein the simulating step further comprises			
2 applying kinematics to the model of the teeth.						
1		24.	The method of claim 19, wherein the simulating step further			
122	comprises app	plying	a constrained motion to the model of the tooth.			
13		25	The method of claim 19, wherein the placing step is based on a			
1 2		25.				
1.02 10	measure of u	idesira	bility to the contacts.			
iñ ₁		26.	The method of claim 25, further comprising optimizing the position of			
3 2	the tooth acco	ording t	to the measure of undesirability.			
g ale		J				
1		27.	The method of claim 26, further comprising minimizing the measure of			
<u> </u>	undesirability	<i>7</i> .				
1		28.	The method of claim 27, wherein the measure of undesirability is a			
2	function of one or more of Peer Assessment Rating (PAR) metrics, distance-based metrics					
3	and shape-ba	sed me	trics.			
1		29.	The method of claim 17, wherein the simulating step includes			
2	providing a l					
2	providing a library of motions.					
1		30.	The method of claim 29, wherein the library of motions includes a			
2	protrusive m	otion.				
	-					
1		31.	The method of claim 29, wherein the library of motions includes a			
2	lateral motio	n.				

1	32. The method of claim 29, wherein the library of motions in	cludes tooth-					
2	guided motions.						
	33. The method of claim 17, wherein the simulating step inclu	des anniving					
1		des applying					
2	physical forces to one jaw.						
1	34. The method of claim 17, wherein the placing step further is	ncludes					
2	pdating the computer representation of the masticatory system with new patient data.						
		d 4-1					
1		tn model,					
2							
3	-						
144							
135	applying a final position transform to the second teeth model; and	I					
<u>-</u> 6	adjusting the position of teeth in the second model based on new	information.					
6 111 121	a control of a patient a tooth	comprising:					
(G1	36. An apparatus to create a digital model of a patient's teeth,	comprising.					
2							
13 14							
14							
13 5	a rotatable table positioned between the radiation source and the	scintillator,					
IU 6	the table being adapted to support an impression of the patient's teeth; and						
7	a computer coupled to the detector to generate the digital model v	vith scanned					
8	8 data.						
	and the second of the second o	on V row					
1		ali A-tay					
2	2 source.						
1	1 38. The apparatus of claim 36, wherein the radiation source is	a computed					
2							
_							
1	1 39. The apparatus of claim 36, wherein the rotatable table is a	dapted to					
2	2 support an upper teeth impression, a lower teeth impression and a bite impression	n.					
,	1 40. The apparatus of claim 36, further comprising a fabrication	on machine					
1							
2	coupled to the computer to generate a plurality of appliances, wherein the appliances						

- 3 comprise polymeric shells having cavities and wherein the cavities of successive shells have
- 4 different geometries shaped to receive and resiliently reposition the teeth from one
- 5 arrangement to a successive arrangement.